

IN THE CLAIMS:

We claim as our invention the following:

1. A interconnect structure, comprising:

(a) a substrate having disposed thereon a topographical structure

5 including a dielectric material and a recess formed therein;

(b) a tungsten silicide film disposed along a surface of the recess;

(c) a tungsten film overlaying said tungsten silicide film; and

(d) a tungsten plug deposited within the recess on said tungsten film.

2. The interconnect structure of claim 1 further including a second tungsten

10 silicide film disposed between the tungsten film and the W-plug.

3. The interconnect structure of claim 1 wherein a tungsten silicide gradient is deposited within said tungsten film.

4. The interconnect structure of claim 1 wherein said tungsten silicide film is deposited from a tungsten silicide target utilizing a sputtering procedure conducted in a
15 deposition chamber.

5. The interconnect structure of claim 4 wherein said tungsten film is deposited from a tungsten coil utilizing a sputtering procedure conducted within a deposition chamber.

6. The barrier layer of claim 1 wherein said tungsten silicide film has a
20 silicon to tungsten (Si:W) ratio greater than 2:1.

7. A method for forming a barrier layer on an interconnect structure, comprising the steps of:

(a) forming a first tungsten silicide film within a recess formed on a topographical structure on a semiconductor substrate;

5 (b) forming a tungsten film onto said first tungsten silicide film; and,

(c) forming a tungsten plug within said recess and over said tungsten film.

8. The method of claim 7 further including the step of forming a second tungsten silicide film, within the recess, between the tungsten film and the tungsten plug.

10 9. The method of claim 7 wherein the step of forming the first tungsten silicide film of the barrier layer includes sputtering the tungsten silicide from a tungsten silicide target in a deposition chamber.

10. The method of claim 7 wherein the step of forming the first tungsten film of the barrier layer includes sputtering the tungsten from a tungsten coil in a deposition
15 chamber.

11. The method of claim 7 further including the step of depositing tungsten silicide gradient within the tungsten film of the barrier layer.

12. A semiconductor manufacturing system comprising:

- (a) a chamber within which sputter deposition is performed;
- (b) a tungsten silicide target mounted in the chamber;
- (c) a tungsten coil mounted in the chamber below the Tungsten

5 silicide target;

(d) a pedestal adapted to support the semiconductor source, positioned below the tungsten coil; and

(e) means, associated with the chamber, for generation of plasma within the chamber above the surface of the semiconductor device.

10 13. The system of claim 12 further comprising a DC-power source coupled to the tungsten silicide target.

14. The system of claim 12 wherein said plasma generation means includes a source of an argon flow discharge connected to the chamber.

15 15. The system of claim 12 further comprising an RF-power source coupled to the tungsten coil.

16. The system of claim 12 further comprising an RF-power source coupled to the pedestal.